Claims

What is claimed is:

1. A wellhead having an external sealing apparatus for clamping a tubing member a first diameter within a tubing member of larger internal diameter, the arrangement comprising

an outer tubing member having an inner circumferential wall with a sealing zone therein;

an inner tubing member adapted to be positioned substantially concentrically within the outer tubing member having an outer circumferential wall with a sealing zone therein;

a circumferential compression system mounted outwardly of the outer tubing member and operable to be activated for compressing the outer tubing member into contact with the inner tubing member for engaging the sealing zones therein and activating a seal between the outer tubing member and the inner tubing member.

2. The wellhead of claim 1, wherein the sealing zone is a metal sealing surface on each of said tubing members for defining a metal-to-metal seal when the compressions system is activated.

3. The wellhead of claim 1, further including a resilient seal member in the sealing zone of one of the tubing members and extending outwardly therefrom toward the other tubing member, wherein the resilient seal member is adapted to be compressed between the two tubing members when the compression system is activated.

4. The wellhead of claim 3, including a second resilient seal member axially in the sealing zone and spaced axially from the first sealing member, creating a gap between the resilient seal members when the compression system is activated.

5. The wellhead of claim 4, including a test port for communicating the gap with the exterior of the assembly for testing the integrity of the seal when activated.

6. The wellhead apparatus of claim 1, wherein the compression system comprises a wedge surface and a flange adapted for engaging the wedge, on of said wedge and flange being each located on one of the outer tubular member and the compression system, whereby the tubular member is compressed radially inwardly upon relative axial movement between the wedge and the flange.

7. The wellhead of claim 6, wherein the compression system is a hydraulic ram adapted for causing axial movement between the wedge and the flange.

8. The wellhead of claim 7, further including a positive lock for locking the wedge and flange in position once the seal has been engaged.

9. The wellhead of claim 1, wherein the compression system comprises annular, axially tapering surface, an axially movable sleeve surrounding the outer wall of the wellhead and has a corresponding tapering surface facing the outer wall, and a driver for producing relative axial movement between the tapering surfaces to exert a radial compressive force to the outer wall of the wellhead.

10. The wellhead of claim 9 , wherein the means for producing relative axial movement comprises a pressure chamber between the sleeve and the wellhead, and means for pressurising the chamber with hydraulic pressure.

11. The wellhead of claim 10, wherein the means for producing relative axial movement comprises a flange on the sleeve, a flange on the wellhead, and means for applying a mechanical force between the flanges to move the sleeve axially along the wellhead.

12. The wellhead of claim 11, wherein a locknut is provided to lock the relative positions of

the sleeve and the wellhead, once these components have been brought into an active, seal engaging position.

13. A method for sealing concentric tubular members in a wellhead, comprising the steps of:

a. placing sealing zones on the mated surfaces of a plurality of concentric tubing members in radial alignment with one another;

b. compressing the outermost tubular member toward the central axis of the concentric tubing members for engaging the sealing zones with one another.

14. The method of claim 9, including the step of locking the compressed assembly in sealing position.

15. The method of claim 9, including the step of placing a redundant resilient seal in the sealing zone.

16. The method of claim 9, including the step of placing a plurality of axially spaced redundant seals in the sealing zone.

17. The method of claim 12, including the step of porting the space between the axially spaced redundant seals to the exterior of the assembly.

18. A wellhead assembly comprising a well head, a first tubing member supported in the wellhead and at least one additional tubing member concentric with and of a smaller diameter than the first tubular member, the assembly comprising:

an external sealing apparatus for clamping a tubing member of a first diameter within a tubing member of larger internal diameter, the arrangement comprising

an outer tubing member having an inner circumferential wall with a sealing zone therein;

an inner tubing member adapted to be positioned substantially concentrically within the outer tubing member having an outer circumferential wall with a sealing zone therein;

a clamp assembly for securing a rigid, generally cylindrical outer tubing member to a rigid, generally cylindrical inner tubing member, the clamp assembly comprising:

an annular compression member radially surrounding the outer tubing member, the annular compression member having a pair of opposed, outwardly-facing ramp surfaces;

a pair of collars radially surrounding the compression member, each of the collars having an inwardly-facing ramp surface for contacting and adjoining one ramp surface of the compression member;

means for axially moving the pair of collars with respect to one another to cause the annular compression member to be deformed radially inwardly to cause the outer tubing member to grip the inner tubing member in a primary clamping grip; and

a locking system to prevent substantial movement of the inner tubing member with respect to the outer tubing member.

19. The assembly of claim 18, further including a circumferential compression system mounted outwardly of the outer tubing member and operable to be activated for compressing the outer tubing member into contact with the inner tubing member for engaging the sealing zones therein and activating a seal between the outer tubing member and the inner tubing member.

20. The assembly of claim 18, wherein the clamp assembly is also operable to be activated for compressing the outer tubing member into contact with the inner tubing member for engaging the sealing zones therein and activating a seal between the outer tubing member and the inner tubing member.

21. The assembly of claim 18 wherein the locking system comprises:

an outwardly and downwardly facing first tapered shoulder associated with the inner member member; and

a complementary inwardly and upwardly facing second tapered shoulder associated with the outer member, the first and second shoulders engaging one another upon failure of the primary clamping grip.

22. The clamp assembly of claim 21 wherein the first tapered shoulder is formed upon an annular member that is affixed by at least one threaded connection to the inner tubing.

23. The clamp assembly of claim 22 wherein the second tapered shoulder is formed within an inner surface of the outer member.

24. The clamp assembly of claim 18, wherein the locking system comprises a slip member disposed between the inner tubing member and outer tubing, said slip member shaped and sized to cause a mechanical gripping between the inner tubing member and outer tubing in the event the primary clamping grip fails.

25. The clamp assembly of claim 24, wherein the slip member is an annular member.

26. The clamp assembly of claim 24, wherein the slip member is a segment of an annular member.

27. The clamp assembly of claim 24, wherein the slip member presents a notched inner surface for gripping the inner tubing member.

28. The clamp assembly of claim 24, wherein the slip member presents a downwardly-tapered outer surface for engagement of a complementary surface on the outer tubing.

29. A wellhead assembly comprising:

an inner, generally cylindrical tubing;

an outer, generally cylindrical tubing that radially surrounds the inner tubing member;

an external sealing apparatus for sealing the annulus between the inner tubing and the outer tubing, comprising

a sealing zone on the internal wall of the outer tubing;

a complementary sealing zone on the outer wall of the inner tubing

a plurality of clamping arrangements secured to the outer tubing, each of said clamping arrangement being selectively moveable between a first position wherein the clamping arrangement does not secure the outer tubing to the inner tubing member and a second position wherein the clamping arrangement radially compress a portion of the outer tubing radially inwardly, each of the clamping arrangements, one of said clamping arrangements radially aligned with the complementary sealing zones, the clamping arrangements comprising:

an annular compression member radially surrounding the outer tubing, the annular compression member having a pair of opposed, outwardly-facing ramp surfaces;

pair of collars radially surrounding the compression member each of the collars having an inwardly-facing ramp surface for contacting an adjoining one ramp surface of the compression member;

and

means for axially moving the pair of collars with respect to one another to cause the

annular compression member to be moved radially inwardly to cause the outer tubing to be compressed radially inwardly.

30. The assembly of claim 29, wherein the clamping arrangements are located at intervals along the outer tubing.

31. The assembly of claim 29, wherein the sealing zones are each a metal sealing surface on each of said tubing members for defining a metal-to-metal seal when the compressions system is activated.

32. The assembly of claim 29, further including a resilient seal member in the sealing zone of one of the tubing members and extending outwardly therefrom toward the other tubing member, wherein the resilient seal member is adapted to be compressed between the two tubing members when the compression system is activated.

33. The assembly of claim 32, including a second resilient seal member axially in the sealing zone and spaced axially from the first sealing member, creating a gap between the resilient seal members when the compression system is activated.

34. The assembly of claim 33, including a test port for communicating the gap with the exterior of the assembly for testing the integrity of the seal when activated.

35. The assembly of claim 29, wherein the compression system comprises a wedge surface and a flange adapted for engaging the wedge, on of said wedge and flange being each located on one of the outer tubular member and the compression system, whereby the tubular member is compressed radially inwardly upon relative axial movement between the wedge and the flange.

36. The assembly of claim 35, wherein the compression system is a hydraulic ram adapted for causing axial movement between the wedge and the flange.

37. The assembly of claim 36, further including a positive lock for locking the wedge and flange in position once the seal has been engaged.

38. The assembly of claim 29, wherein the compression system comprises annular, axially tapering surface, an axially movable sleeve surrounding the outer wall of the wellhead and has a corresponding tapering surface facing the outer wall, and a driver for producing relative axial movement between the tapering surfaces to exert a radial compressive force to the outer wall of the wellhead.

39. The assembly of claim 38 , wherein the means for producing relative axial movement comprises a pressure chamber between the sleeve and the wellhead, and means for pressurising the chamber with hydraulic pressure.

40. The assembly of claim 39, wherein the means for producing relative axial movement comprises a flange on the sleeve, a flange on the wellhead, and means for applying a mechanical force between the flanges to move the sleeve axially along the wellhead.

41. The assembly of claim 40, wherein a locknut is provided to lock the relative positions of the sleeve and the wellhead, once these components have been brought into an active, seal engaging position.